Revised 09/03

CORRES CONTROL
INCOMING LTR NO 00905 RFO 3

DUE DATE
ACTION

United States Government **Department of Energy**

Memorandum

Rocky Flats Field Office

SEP 30 2003

DIST	LTR	ENC
BERARDINI, J. H.	X	X
BOGNAR, E. S.	X	X
BROOKS, L.	X	X
BUTLER, L.	X	X
CROCKETT, G. A.		
DECK, C. A.	X	X
DEGENHART, K. R.		
DIETER, T. J.	X	X
DIETERLE, S. E.		
FERRERA, D. W.	X	X
GIACOMINI, J. J.		
HIETT, S. B.	X	X
ISOM, J. H.		
LINDSAY, D. C.		
LONG, J. W.		
LYLE, J. L.	X	X
MARTINEZ, L. A.	X	X
NAGEL, R. E.	X	X
NORTH, K.	X	X
PARKER, A. M.		
RODGERS, A. D.		
SHELTON, D. C.	X	X
SPEARS, M. S.		
TRICE, K. D.		
TUOR, N. B.		
WILLIAMS, J. L.		
Zahm, C.	X	X
Parsons, D.	X	X

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DOE ORDER #
5400.1

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DOCUMENT CLASSIFICATION REVIEW WAIVER PER CLASSIFICATION OFFICE

AMP SET.03-01340

Building 865 Post Closure File for Rocky Flats Environmental Technology Site Administrative Record

Laura Brooks
Administrative Records
Kaiser-Hill Company, LLC

Reference: Letter from Phyllis C Weaver, Oak Ridge Institute for Science and Education to Mr Steven Tower, dated August 25, 2003, subject. Pre-Demolition Survey Letter Report for the Building 865 Closure Project at the Rocky Flats Closure Project Site

The attachment is provided for placement in the post-closure file of Building 865 in the Rocky Flats Environmental Technology Site Administrative Record.

Sincerely,

Steven E Tower, Project Director
Industrial Area Decommissioning

cc.
E Schmitt, OOM, RFFO

ADMIN RECORD

B865-A-000074

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

August 25, 2003

03 SEP -3 AM 11:46
ECBH

Mr Steven Tower
U S Department of Energy
Rocky Flats Field Office
10808 Hwy 93, Unit A
Golden, CO 80403

SUBJECT: PRE-DEMOLITION VERIFICATION SURVEY LETTER REPORT FOR THE BUILDING 865 CLOSURE PROJECT AT THE ROCKY FLATS CLOSURE PROJECT SITE, GOLDEN, COLORADO [DOE CONTRACT NO. DE-AC05-00OR22750]

Dear Mr Tower

The Rocky Flats Closure Project (RFCP) Site, located approximately 16 miles northwest of Denver, Colorado on State Highway 93 and Cactus Road, occupies approximately 385 acres within the 6,000-acre Department of Energy (DOE) reservation site (Figure 1) The site has been divided into two major operable units the Industrial Area which encompasses all designated nuclear facilities and the Buffer Zone The Building 865 Cluster Closure Project facilities are located in the southeastern quadrant of the Industrial Area (Figure 2)

Kaiser-Hill Company (K-H), L L C is the DOE Contractor responsible for closure of the Rocky Flats Environmental Technology Site (RFETS) by the year 2006. To meet the closure goal, K-H plans to characterize, remediate, perform pre-demolition surveys (PDS) and demolish each building at the site. Building 865 was the primary process facility in a cluster of facilities including Buildings 866, 867 and 868 that served as auxiliary support to Building 865 operations

Building 865 is a rectangular structure, constructed of pre-cast concrete twin-tee panels and concrete blocks with low-and high-bay areas Building 865 was determined to be an RFCP-defined Type 2 facility (K-H 2001) It was used for research and development on non-plutonium metals, primarily depleted uranium, to fabricate prototype hardware and develop metal alloys and processes The high-bay primarily housed the metal working operations Building support equipment for these operations was located in the mezzanine which consisted of a 9 1 m × 22 9 m area located in the high-bay Rooms 145, 148, and 153A lower walls and floor, and the Room 145 mezzanine floor topside were designated as Class 1 areas Rooms 171 and 172 floors, walls, and ceiling, Rooms 145, 148, and 153A upper walls, and the underside of Room 145 mezzanine floor, were designated as Class 2 (Figure 3) (K-H-2003a)

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The low-bay area housed the facility's former offices, machine and maintenance shops, laboratory, utilities, and comfort facilities Three areas in the low-bay were designated as Class 1 the former Room 108; the east side of former Room 135, and the area containing former rooms 136,137,138,139,142, and 149 (Figure 4) The remainder of the facility was designated as Class 2 (K-H 2002) All inner walls had been removed.

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) recently performed the independent verification (IV) PDS of Building 865 at RFCP site Survey activities performed by ESSAP during the period between July 21 and 24, 2003 consisted of alpha plus beta surface scans, direct measurements for both alpha and beta total activity, and the collection of sample media consisting of smears, concrete, and insulation material Survey activities were performed in accordance with the ESSAP Survey Procedures and Quality Assurance manuals (ORISE 2003a and 2003b) and in accordance with the ESSAP Building 865 project-specific plan (PSP) (ORISE 2002) The in-process inspection portions of the PSP could not be performed due to scheduling conflicts and building entry requirements Additionally, ESSAP reviewed site historical documentation and the building pre-demolition survey plans, prepared by K-H, prior to IV survey activities (K-H 2001) Data from the K-H PDS were provided to ESSAP after arrival at the site (K-H 2003b and c) The independent verification objective was to independently evaluate the contractor's assessment of the radiological status of Building 865 relative to the unrestricted release guidelines

Entry into the high-bay portion of Building 865 required that the ESSAP staff don protective clothing, in accordance with the building entry requirements, and at least one of the ESSAP team members wore a breathing zone apparatus during periods of entry to monitor for airborne beryllium The low-bay portion of Building 865 had been down-posted for both the radiological and beryllium components.

ESSAP utilized the reference system established by K-H and any prominent building features to identify measurement and sampling locations Measurement and sampling locations were documented on detailed survey maps

ESSAP team members initiated scans of the upper wall and ceiling areas in the high-bay and obtained material specific background information used for correcting surface activity measurements Because the main floor of the high-bay will be disposed of as radioactive waste, no verification floor scans were performed Scans of approximately twenty-five percent of the upper wall and ceiling areas, fifty percent of the mezzanine area (including the floor), and one-hundred percent of the lower walls, were completed in the high-bay Particular attention was given to horizontal surfaces, crane rails, and the mezzanine floor Scans for alpha plus beta radiation were performed on one-hundred percent of the low-bay floor and lower walls and on approximately ten percent of the ceiling and upper walls Particular attention was given to horizontal surfaces and remaining crane rail in the areas that had been used for machining and other mechanical applications Floors were scanned using a Ludlum model 43-37 gas

proportional detector, coupled to Ludlum model 2221 ratemeter-scaler Alpha plus beta scans on walls and ceilings were performed using Ludlum model 43-68 gas proportional detectors coupled to Ludlum model 2221 ratemeter-scalers with audible indicators

Direct measurements for total activity were obtained from sixteen upper wall locations, seven judgmental locations on the mezzanine level floor and lower wall, and nine lower wall measurements in the high-bay Additional five-point measurements were performed within two gridblocks where it was necessary to calculate 1-m^2 average activity levels One of the measurements was collected for data comparison purposes from a location previously measured by K-H in the high-bay (Figure 3)

Twenty predetermined random-start sampling locations for surface activity were identified for the low-bay floor and lower walls In addition, four upper wall and ceiling locations and three judgmental location measurements and samples were identified (Figure 4) For data comparison, thirteen of the sampling locations that were randomly generated were also the site of K-H measurement and sampling locations

Smears to determine removable gross alpha and gross beta activity were collected at each individual direct measurement location in the low- and high-bay and at the location of the highest activity in each five-point gridblock in the high-bay

Five miscellaneous samples, including concrete, insulation fibers, and the foil backing for the insulation, were collected from locations of elevated radiation in the high-bay These samples were collected for the purpose of validating the contaminants present

Survey results were compared with the applicable release criteria found in DOE Order 5400 5 (DOE 1990). These guidelines have been adapted as the site $DCGL_W$, which only has allowances for 1 m^2 average activity and single hot spot criteria of three times the average guideline in a 100 cm^2 area The applicable surface activity guidelines for depleted uranium are

Total Activity

5,000 α dpm/100 cm^2, averaged over a 1 m^2 area
15,000 α dpm/100 cm^2, maximum in a 100 cm^2 area

Removable Activity
1,000 α dpm/100 cm^2

The uranium surface activity guidelines specify alpha activity However, because rough, dirty, or porous surfaces selectively attenuate alpha radiation, beta surface activity measurements are typically performed for the uranium surface guidelines

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Radiological samples and data were returned to the ORISE/ESSAP laboratory in Oak Ridge, Tennessee, for analysis and interpretation Radiological sample analyses were performed in accordance with the ORISE/ESSAP Laboratory Procedures Manual (ORISE 2003c) Smear samples were analyzed for gross alpha and gross beta activity using a low-background proportional counter Direct measurement data and smear data for radiological contamination were converted into units of disintegrations per minute per one hundred square centimeters (dpm/100 cm^2). All miscellaneous radiological samples were analyzed by gamma spectroscopy in which spectra were reviewed for the radionuclides of interest as well as for any other identifiable photopeaks Concrete samples 004 and 005 were analyzed by alpha spectroscopy for Pu-239 Miscellaneous sample results were reported in units of picocuries per gram (pCi/g)

Scans of the surveyed areas in the low-bay identified a few locations in which additional investigation by the ESSAP team was conducted a small mat in front of the exit door on the west side of the building, along the base of a column adjacent to the south wall, and an open floor drain, which was in addition to the floor drain in the Class 1 area that had been visibly marked and taped off by K-H A small crack in the floor near the drain had also been previously marked by K-H ESSAP obtained measurements from the top outer surface of the open drain and confirmed that activity in this drain was also in excess of the guidelines. K-H was notified of the drain during the close-out meeting This particular drain is located in a Class 2 area, however, it appears to be a continuum of the drain line already labeled by K-H The entire drain line will be removed as radioactive waste prior to demolition of the building

Scan surveys in the high-bay identified elevated activity in several locations on the lower walls, upper wall horizontal surfaces, and on the floor of the mezzanine These locations were marked for additional investigation Scans identified locations of elevated radiation on several horizontal surfaces, particularly on the mezzanine floor, on the lower wall on the exterior east wall of Room 148 at approximately one meter above the floor, and on the south wall at approximately the two meter level (on the outside of the foil covering for the wall insulation)

A summary of total and removable surface activity levels for the high-bay are presented in Table 1 and the low-bay results are presented in Table 2 Total alpha activity in the high-bay ranged from -48 to 7,000 dpm/100 cm^2 and total beta activity ranged from -170 to 25,000 dpm/100 cm^2 Removable alpha activity ranged from 0 to 160 dpm/100 cm^2 and beta activity ranged from -3 to 320 dpm/100 cm^2 The mezzanine floor had the highest total beta activity detected ranging from 7,000 dpm/100 cm^2 to 25,000 dpm/100 cm^2 Total alpha activity levels in the low-bay ranged from -71 to 410 dpm/100 cm^2 and for beta, the total activity ranged from -400 to 9,300 dpm/100 cm^2 The 9,300 dpm/100 cm^2 was obtained from the top surface of the drain Removable for alpha activity ranged from 0 to 3 dpm/100 cm^2 and beta activity ranged from -5 to 5 dpm/100 cm^2

The results of gamma spectroscopy on miscellaneous samples collected from the high-bay confirmed the presence of depleted uranium as the radionuclide of concern The results are presented in Table 3 U-238 ranged from 6 31 to 1,110 pCi/g and 0 21 to 5 67 pCi/g for U-235

Samples 001 to 003 consisted of wall insulation material having concentrations of U-238 at 343 pCi/g, 362 pCi/g, and 1,110 pCi/g Alpha spectroscopy results did not identify any measurable concentration of Pu-239 in either concrete sample

A review of the K-H data of the low- and high-bay did not identify any areas, other than the floor of the high-bay, which exceeded the guideline criteria However, measurements obtained by ESSAP did identify some areas that required additional investigation The investigation of the mezzanine floor identified several locations greater than the action levels Total beta activity measurements by ESSAP from the mezzanine floor ranged from 7,000 dpm/100 cm^2 to 25,000 dpm/100 cm^2 Only one of the measurements exceeded the hot spot criteria of 15,000 dpm/100 cm^2 The other individual measurements on the floor area indicated that activity in excess of the average activity guideline was present and covered an area greater than $1m^2$ The condition of the mezzanine floor, in that there were numerous openings where there once had been equipment penetrations, made obtaining a five-point measurement impractical at all locations of elevated radiation Total beta activity data reported by K-H from measurements collected on the mezzanine floor ranged from 116 to 2,736 dpm/100 cm^2 (K-H 2003c) A comparison measurement was made by a K-H representative during the IV survey at the highest activity location identified by ESSAP on the mezzanine floor, location 17 The K-H measured activity was 26,000 dpm/100 cm^2 This compared well with the ESSAP result of 25,000 dpm/100 cm^2 Two additional comparison measurements were obtained by K-H at ESSAP locations 7 and 8 The K-H measurements were twenty to thirty percent lower than the ESSAP measurements

ESSAP performed two five-point gridblock measurements, one from the lower wall on the east exterior wall of Room 148 (averaging 7,000 dpm/100 cm^2) and another from the south wall at the 2 meter level on the outer surface of the wall insulation (averaging 5,500 dpm/100 cm^2). These measurements indicated that the guideline criteria for averaging over one square meter were not met

Data collected by ESSAP for the low-bay indicated that the guidelines for unrestricted release have been met with the exception of the drain line that remains in the floor An additional investigation of two other areas in the low-bay did not indicate any activity exceeding the guidelines

Based on the independent verification survey results, it is ESSAP's opinion that activity in excess of the guidelines remained at the time of the survey Based on data available during the survey the ESSAP results do not support the conclusion that the survey areas in the high-bay meet the criteria for unrestricted release For the areas that did not meet the release criteria, K-H site personnel stated that additional decontamination and survey of the areas identified would be completed

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Please contact me at (865) 576-5321 or Timothy J Vitkus at (865) 576-5073 should you have any questions or require additional information

Sincerely,

Phyllis C Weaver
Health Physicist/Project Leader
Environmental Survey and
Site Assessment Program

PCW ar

Enclosures

cc R DiSalvo, RFFO/DOE
D Parsons, RISS/K-H
File/0958
E. Abelquist, ORISE/ESSAP
T Vitkus, ORISE/ESSAP

Distribution approval and concurrence:	Initials	Date
Technical Management Team Member	TW	8/26/2003
Laboratory Manager	RDC	8/26/2003
Quality Manager	ATP	8/26/2003

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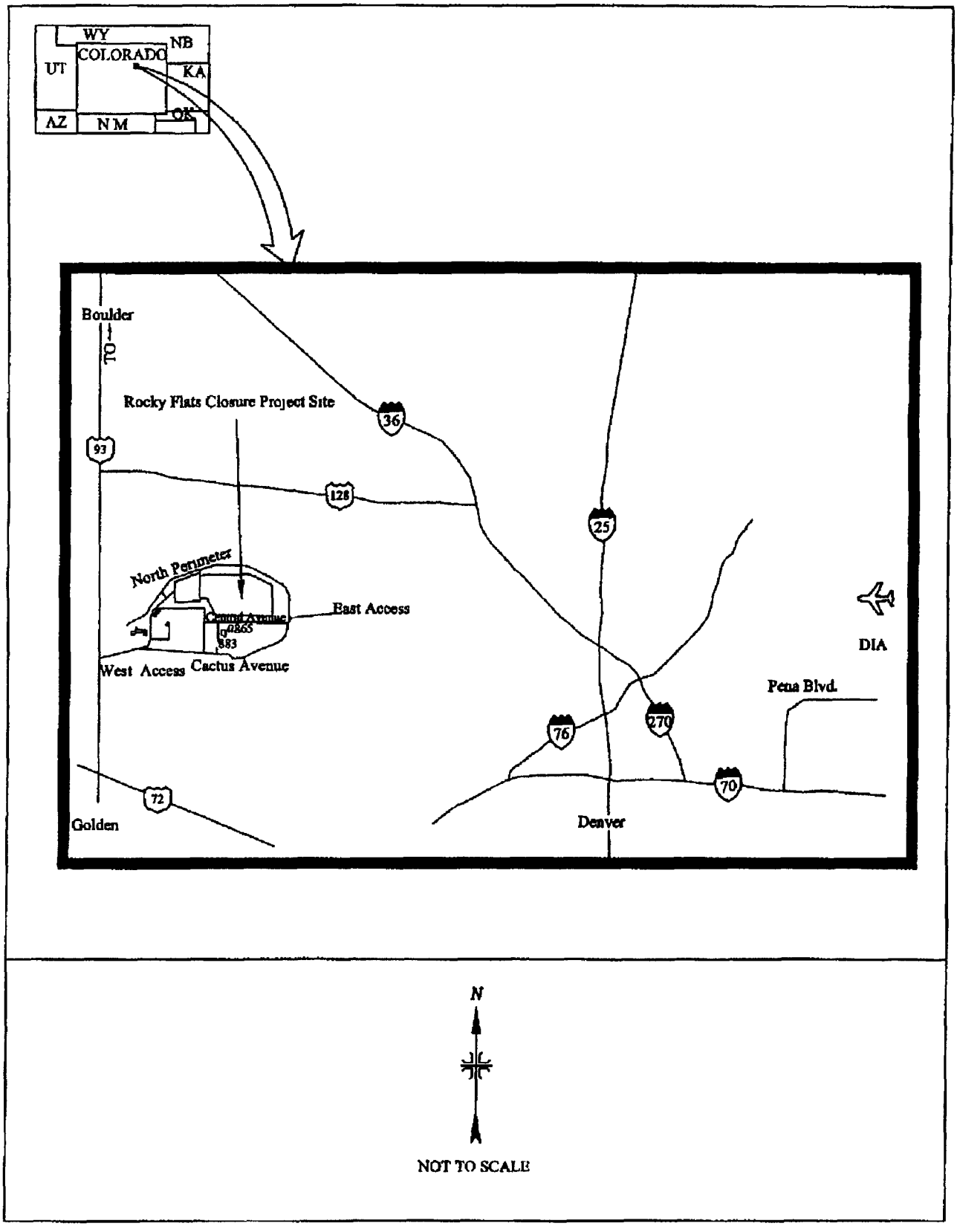

FIGURE 1: Location of the Rocky Flats Closure Project Site

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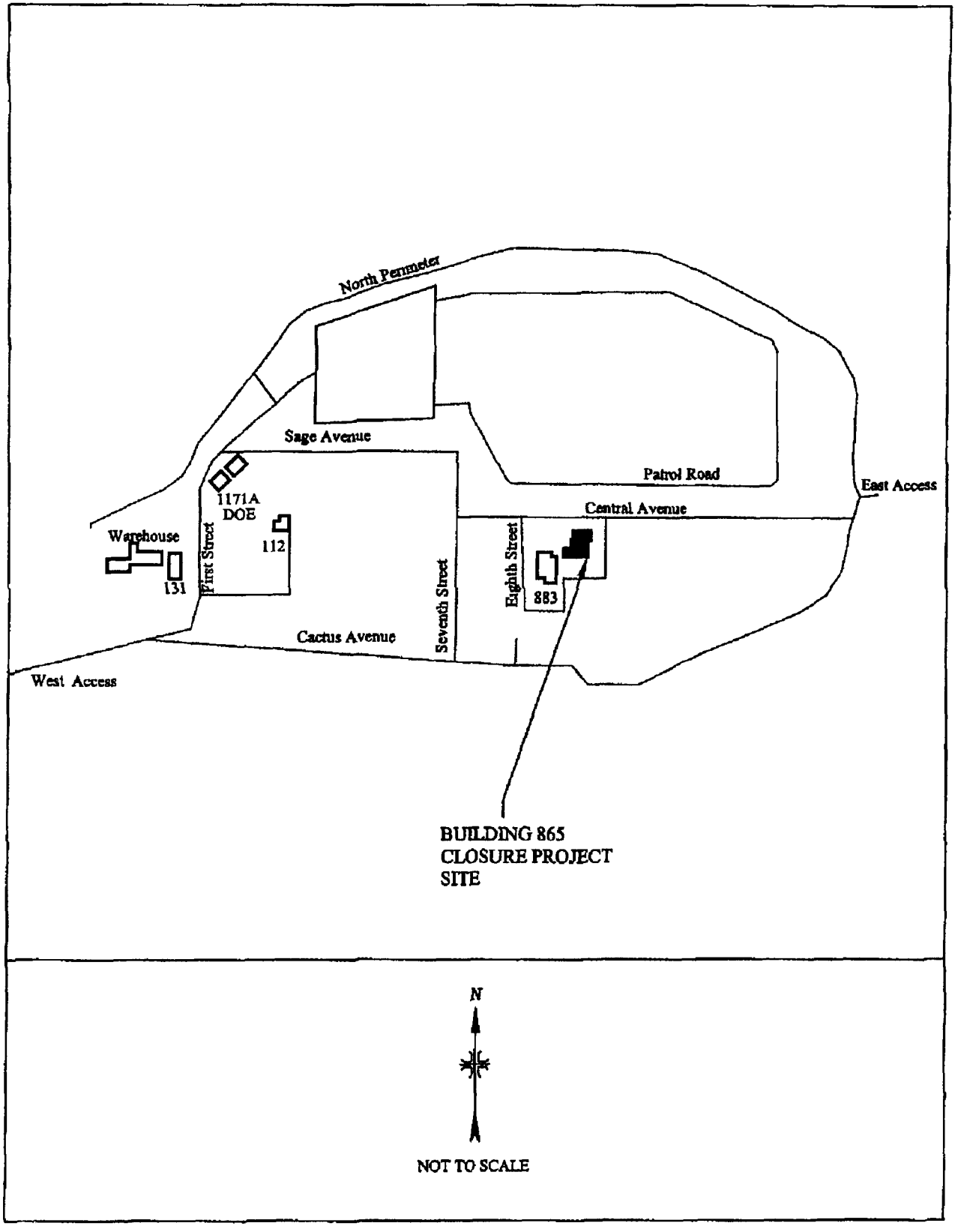


FIGURE 2· Plot Plan of the Rocky Flats Closure Project Site

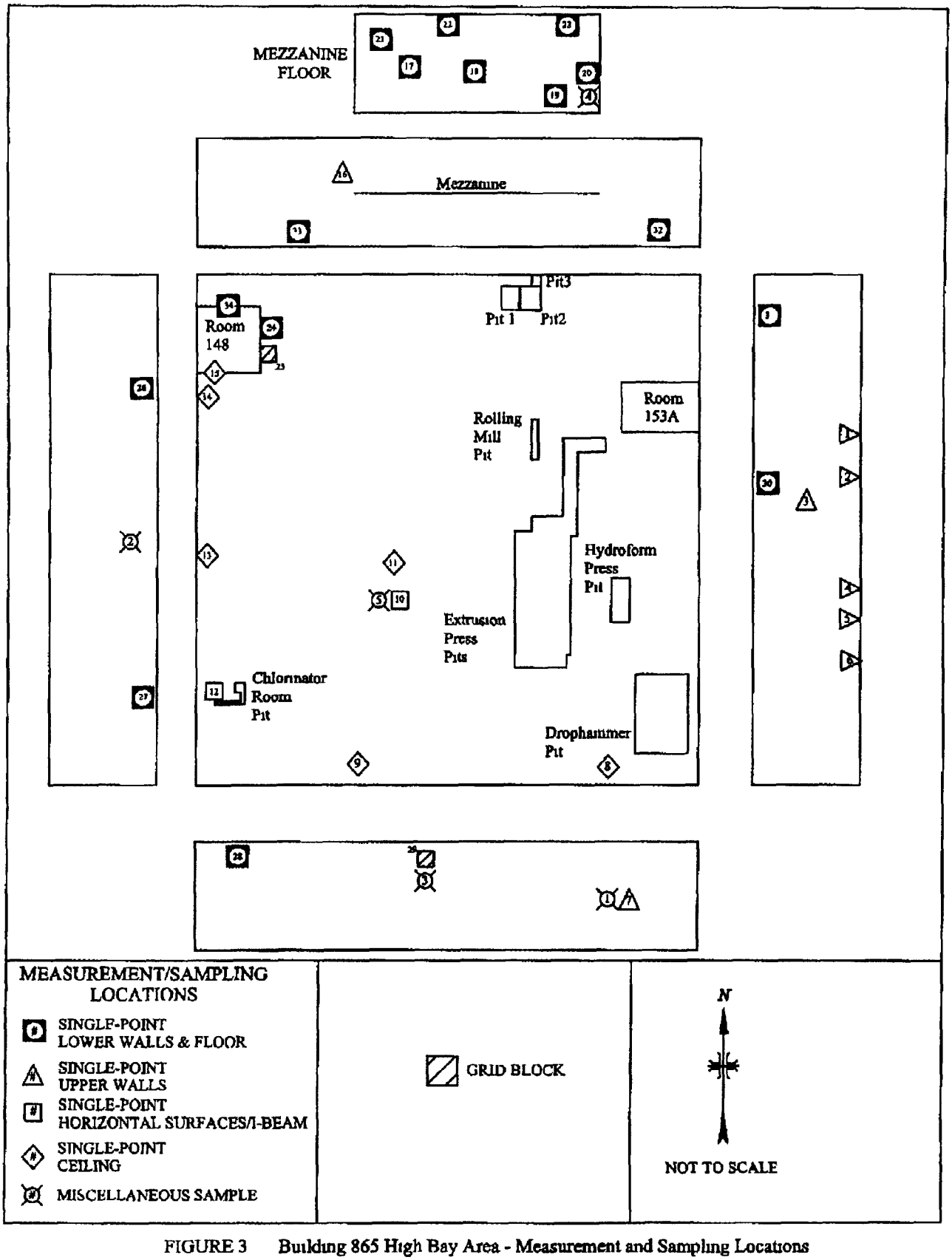
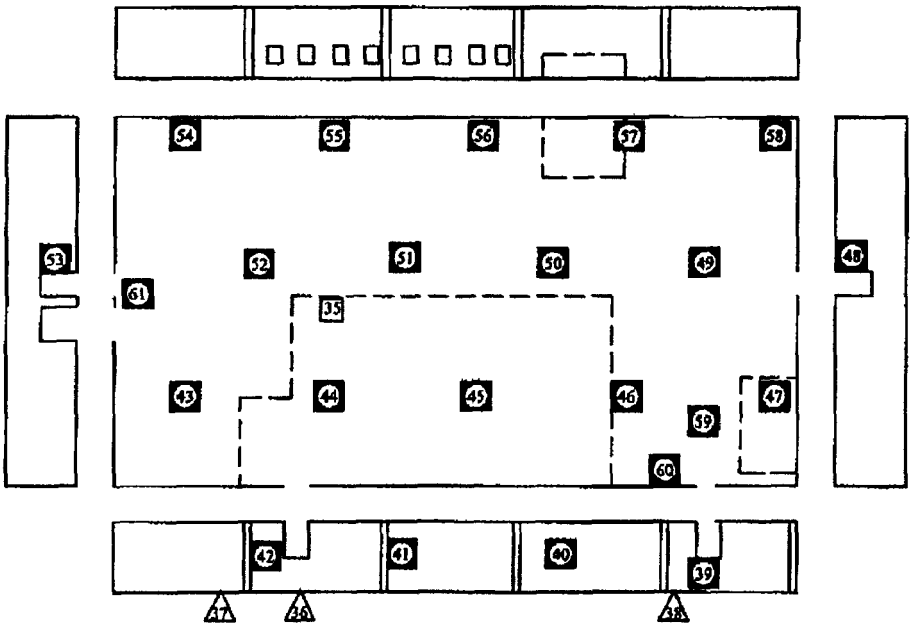


FIGURE 3 Building 865 High Bay Area - Measurement and Sampling Locations



MEASUREMENT/SAMPLING LOCATIONS

- SINGLE-POINT LOWER WALLS & FLOOR
- SINGLE-POINT UPPER WALLS
- SINGLE-POINT HORIZONTAL SURFACES/I-BEAM

N

NOT TO SCALE

FIGURE 4 Building 865 Low Bay Area - Measurement and Sampling Locations

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TABLE 1

SUMMARY OF SURFACE ACTIVITY LEVELS
BUILDING 865 HIGH BAY
ROCKY FLATS CLOSURE PROJECT
GOLDEN, COLORADO

Measurement Location[a]	Total Activity (dpm/100 cm^2)		Removable Activity (dpm/100 cm^2)	
	Alpha	Beta	Alpha	Beta
Upper Walls				
1	570	1,000	7	4
2	40	230	1	-1
3	410	1,700	11	11
4	940	3,400	5	2
5	660	2,000	1	1
6	1,300	3,600	0	-1
7	2,000	7,500	13	6
7[b]	--[c]	5,800	--	--
8	320	5,700	1	1
8[b]	--	3,900	--	--
9	16	190	0	-2
10	-32	720	7	3
11	1,200	3,000	9	8
12	440	2,300	3	9
13	40	100	0	1
14	48	4,600	0	-1
15	310	3,700	0	1
16	190	6,300	5	8
Mezzanine Floor				
17	800	25,000	5	12
17[b]	--	26,000		
18	160	13,000	1	4
19	110	10,000	3	1
20	180	7,000	3	5
21	290	14,000	0	6

TABLE 1 (Continued)

SUMMARY OF SURFACE ACTIVITY LEVELS
BUILDING 865 HIGH BAY
ROCKY FLATS CLOSURE SITE
GOLDEN, COLORADO

Measurement Location[a]	Total Activity (dpm/100 cm^2)		Removable Activity (dpm/100 cm^2)	
	Alpha	Beta	Alpha	Beta
Mezzanine Lower Wall				
22	-8	37	0	-2
23	-48	130	0	4
Lower Walls				
24	6,000	10,000	24	34
25, pt A	7,000	11,000	150	210
25, pt B	6,600	4,800	--	--
25, pt C	4,300	6,400	--	--
25, pt. D	5,300	9,000	--	--
25, pt E	2,000	3,900	--	--
1 m^2 Average	5,000	7,000	--	--
26	-40	27	1	4
27	40	530	1	17
28	-24	120	0	-2
29, pt A	1,400	7,500	160	320
29, pt. B	740	11,000	--	--
29, pt C	1,500	8,000	--	--
29, pt D	230	520	--	--
29, pt E	220	630	--	--
1 m^2 Average	800	5,500	--	--
30	95	790	0	-3
31	0	-85	0	3
32	24	110	0	1
33	87	130	0	-3
34	16	-170	0	5

[a] Refer to Figure 3
[b] K-H measurement comparison taken during ESSAP survey
[c] Measurement or sample not collected

TABLE 2

SUMMARY OF SURFACE ACTIVITY LEVELS
BUILDING 865 LOW BAY
ROCKY FLATS CLOSURE PROJECT
GOLDEN, COLORADO

Measurement Location[a]	Total Activity (dpm/100 cm^2)		Removable Activity (dpm/100 cm^2)	
	Alpha	Beta	Alpha	Beta
Upper Walls				
35	140	-240	1	-3
36	150	380	0	-2
37	410	2,100	1	1
38	63	230	0	5
Lower Walls				
39	-8	-240	0	-4
40	16	-400	0	2
41	-8	-270	0	-3
42	-32	-370	0	1
Floor				
43	40	310	0	-2
43 (120)[b]	--[c]	787	--	--
44	48	490	0	-2
44 (123)	--	796	--	--
45	-71	230	1	-1
45 (126)	--	774	--	--
46	0	340	0	-2
46 (130)	--	1,021	--	--
47	56	200	0	-5
48	79	300	0	-2
49	56	390	0	-5
49 (63)	--	815	--	--

TABLE 2 (Continued)

SUMMARY OF SURFACE ACTIVITY LEVELS
BUILDING 865 LOW BAY
ROCKY FLATS CLOSURE SITE
GOLDEN, COLORADO

Measurement Location[a]	Total Activity (dpm/100 cm^2)		Removable Activity (dpm/100 cm^2)	
	Alpha	Beta	Alpha	Beta
50	16	550	1	-2
50 (60)	--	844	--	--
51	32	440	1	3
51 (57)	--	797	--	--
52	40	410	0	-4
52 (54)	--	702	--	--
53	48	660	3	-1
53 (50)	--	75	--	--
54	40	400	1	-1
54 (18)	--	352	--	--
55	71	460	0	-4
55 (21)	--	566	--	--
56	24	350	0	-1
56 (25)	--	657	--	--
57	40	390	1	3
57 (29)	--	548	--	--
58	63	440	0	-1
59	8	9,300	1	-1
60	40	1,400	0	-1
61	-48	2,600	0	-2

[a] Refer to Figure 4
[b] K-H measurement location ID from final status survey and reported beta activity
[c] Measurement or sample not collected

TABLE 3

RADIONUCLIDE CONCENTRATIONS IN MISCELLANEOUS SAMPLES
BUILDING 865 HIGH-BAY
ROCKY FLATS CLOSURE PROJECT
GOLDEN, COLORADO

Sample[a] Number	Sample Type	Radionuclide Concentrations (pCi/g)[b]		
		U-238	U-235	Pu-239
001	Insulation	343 ± 26[c] (4 7)[d]	5 67 ± 0 69 (0 30)	---[e]
002	Insulation	362 ± 28 (6 9)	5 14 ± 0 80 (0 48)	---
003	Insulation	1,110 ± 200 (146)	8 ± 16 (14)	---
004	Concrete	44 3 ± 3 1 (1 01)	0 72 ± 0 06 (0 04)	0 00 ± 0 01 (0 02)
005	Concrete	6 31 ± 0 67 (0 37)	0 21 ± 0 03 (0 02)	0 00 ± 0 01 (0 02)

[a]Refer to figure 3

[b]Photopeaks used for determining the activities of radionuclides of concern

U-235 0 143 MeV (or 0 186 MeV)

U-238 0 063 MeV from Th-234* (or 1 001 MeV from Pa-234 m)*

*Secular equilibrium assumed

[c]Uncertainties represent the 95% confidence level, based on total propagated uncertainty

[d]( )=sample MDC

[e]Analysis not performed

REFERENCES

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Kaiser-Hill Company Rocky Flats Environmental Technology Site Type 2 Radiological Pre-Demolition Survey Plan, 865 High Bay Closure Project Golden Colorado, June 16, 2003a

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Oak Ridge Institute for Science and Education Quality Assurance Manual for the Environmental Survey and Site Assessment Program Oak Ridge, Tennessee, May 14, 2003b

Oak Ridge Institute for Science and Education Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program Oak Ridge, Tennessee, February 28, 2003c

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